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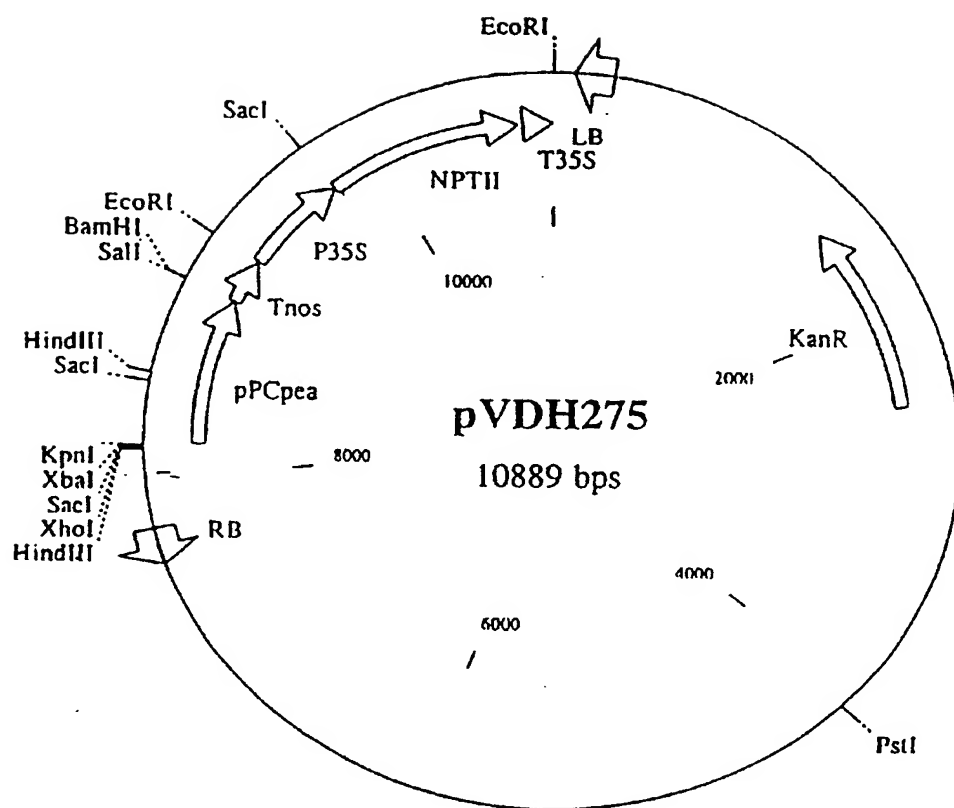


Fig. 1

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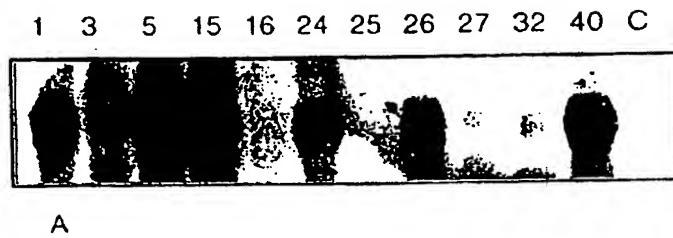


Fig. 2

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LINEUP of: TPSPLANT from: 1 to: 595 April 19, 1996 14:01 ..

	1	50
Tpsyest	MTTDNAKAQL TSSSGGNIIV VSNRLPVTIT KNSSTGQY EY AMSSGGLVTA	
	51	100
Tpsyest	LEGLKKTYTF KWFGWPGLEI PDDEKDQVRK DLLEKFNAVP IFLSDEIADL	
	101	150
Tpsssel8		
Tpsyest	HYNGFSNSIL WPLFHYHPGE INF DENAWLA YNEANQTFTN EIAKTMNHND	
	151	200
Tpsrice2		YRSLPVR
Tpsun10		GWFLHTPFPS SEVYKTLPMR
Tpsssel43		GWFLHTPFPS SEIYRTLPLR
Tpsssel8	IMWVHDYHLC LVPQMIROKL PDVQI.....	GFFLHTAFPS SEVFRCLAAR
Tpsyest	LIWVHDYHLM LVPEMLRVKI HEKQLQNVKV	GWFLHTPFPS SEIYRILPVR
	201	250
Tpsrice2	DEILKSL LNC DLIGFHTFDY ARHFLSCCSR MLGIEYQSKR	GYIGLDYFGR
Tpsun10	NELLKGL LNA DLIGFHTYDY ARHFLTCCSR MFGLDHQLKR	GYIFLEYNGR
Tpsssel43	AELLQGV LGA DLVGFHTYDY ARHFVS....	..AMHTDTRA GRHSQGVEDQ
Tpsssel8	KELLDGMLGA NLVAFQTPEY AHHFLQ....	..XVQSHXSL LKQRP.....
Tpsyest	QEILKGV LSC DLVGFHTYDY ARHFLSSVQR VLNVTNL PNG	VEYQGRFVNV
	251	300
Tpsrice2	TVGIKIM PVG INMTQLQTQI RLPDLEWRVA NSGSSLMGRL	SCSVWMIWTY
Ricetps		EWRV SELQQQFEGK .....TVL ....LGVD DM
Tpsun10	SIEIKIKASG IHVGRMESYL SQPDTRLQVQ EVK..KEIVL	....LGVD DL
Tpsssel43	GKITRVAA.. FPDVDFGAIY RRVETDAVKK HMQELSQVLL	S*GYVGVDR L
Tpsssel8	.....KA.. FS.XRFVNVW ...SX..MQE ALRXVKKVIV	ARDKL TTSR.
Tpsyest	GAPPIGIDVD KFTDGLKKES VQKRIQQLKE TFKGCKIIV.	.....GVDRL
	301	350
Tpsatal3		.G
Tpsatal56		N EELRGKVVLV QITNPARSS. ....G
Tpsrice2	LR..GLI*KF LRFEQMLRTH PKWQPRQFWC RFKPRVVVGR	TLXYSXDX XV
Ricetps	DIFKGINLKL LAFENMLRTH PKWQGRAVLV QIANPARGK.	.....G
Tpsun10	DIFKGVNFKV LALEKLLKSH PSWQGRVVLV QILNPSR.R.	.....C
Tpsssel43	DMIKGIPQKL LAFEFLEEN SEWRDKVVLV QIAVPTRTD.	.....V
Tpsssel8	.....VREKL LSYELFLNKN PQWRDKVVLV QVATSTEDS	ELAATXYPKL
Tpsyest	DYIKGVPQKL HAMEVFLNEH PEWRGKVVLV QVAVPSRGDV	EEYQYLR SVV

Fig. 3A

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	351		400
Tpsatal3	IDVEEIRGEI	EESCRRING. EFGKXGYQPI	IYIDXPVSIN EINAYXHIAE
Tpsatal56	KDVQDVEKQI	NXIADDEINSK FGRPGGYKPI	VFVNGPVSTL DKVAYYAISE
Tpsrice2	QXVMTFQAGI	SL	
Ricetps	KDLEAIQAEI	HESCKRING. EFGQSGYSPV	VFIDRDVSSV EEDCLLHNSR
Tpssun10	QDVDEINAEI	RTVCERINN. ELGSPGYQPV	VLIDGPVSLS EKAAYYVIAD
Tpssel43	LEYQKLTSQV	HEIVGRING. RFGSLTAVPI	HHLDRSMKFP ELCALYAITD
Tpssel18	LHVLTLCTRR	SHTPTRLPQ. ARHCVLAVPR	TSLDRRCSCN QLF.....
Tpsyeast	NELVG.....	.....RING. QFGTVEFVPI	HFMHKSIPFE ELISLYAVSD
	401		450
Tpsatal3	CVVVTAVRDG	MNLTPYEYIV CRQGLLGSES	DFSGPKKSMML ....VASXFI
Tpsatal56	CVVVNXVRDG	MNLVPYKYTV TRQGSPALDA	ALGFGEEDVR KSVIIVSEFI
Tpsatal142			AVVDSSPR TSTLVVSEFI
Tpsrice3			GP K KSMMLVVSEFI
Ricetps	MCGGDCC*GW	D*LDTIWIYC L*GRGLTXHQ	R
Tpssun10	MAIVTPLRDG	MNLV	
Tpssel43	VLLVTSLRDG	MNFV	
Tpssel18	.....DG	MNLV	
Tpsyeast	VCLVSSTRDG	MNLVSYEYIA CQEE.....	.....K KGSLILSEFT
	451		500
Tpsatal3	WMXPFRXLGA	IRVNPW	
Tpsatal56	GCXP.SLSGA	IXVNPWNIXA V	
Tpsatal142	GCSP.SLSGA	IRVNPWDVDA VAEAVNSALK	MSETEKQLRH EKHYHYISTH
Tpsrice3	GCSP.SLSGA	IRVNPWNIEA TAEALNEAIS	MSERXKQLRH EKHYRYVSTH
Tpsyeast	GAAQ.SLNGA	IIVNPWNTDD LSDAINEALT	LPDVKKEVNW EKLYKYISKY
	501		550
Tpsatal142	DVGTWAKSFM	QDLERACRDH YSKRCWGIGF	GLGFRVLSLSP SFRKLS
Tpsrice3	DVAYWSKSFV	QDLERACKDH FRKPCWGIGX	GFRXR
Tpsyeast	TSAFWGENFV	HELYSTSSSS TSSSATKN**	TRCK*DDRLE LVRFSLSLL
	551		595
Tpsyeast	FTFFILYIKL	YK*HN*NATR PLLFVNACL*	RC*LKLRLK*F FHRIG

Fig. 3B

84 89 88 87

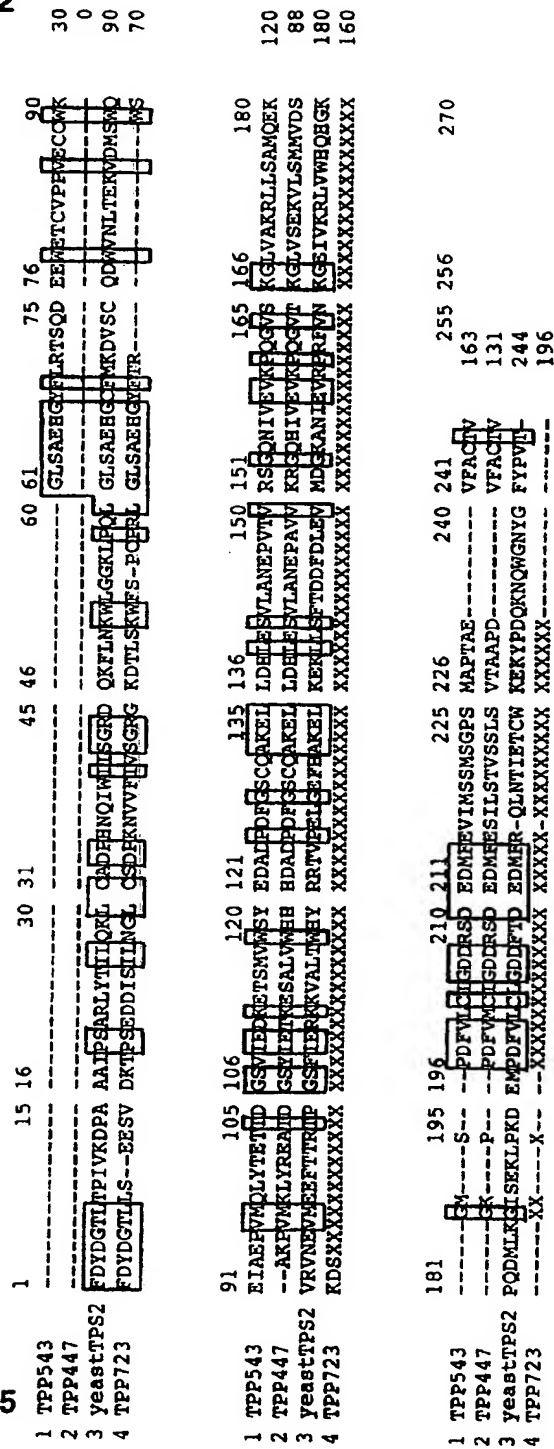
Fig. 4

	1	15	16	30	31	45	46	60	61	75	76	90
1	TPS840	---	CHIDPRNC	-SE	RVMZLCVVKQF	--EG	KTVLLGADMDIIFKG	MNIKILAMEQMINIT	PSGKRGULCWSKIANE	TRGKGVDQDEIQAEI		
2	TPS630	IIMGFSFNLDLP	-ET	EAKVFGTRQOQNEQC	RTLLIGVMDMDIIFKG	ISLKLAMEQIILQH	PEKQKGVVLVQITANE	ARGKGDVKEVQEET				
3	TPS825	IIMGQIQNVMSLADT	GKKAKELKEV	--EG	KIVMLGUDMDMEFG	IGLKFTANGSLIDEN	EWLRCKVVLVXXXXXX	XXXXXXXXXXXXXXXXXX				
4	yeastTPS1	-DVDKFTDGLKKEV	QKR	IQOQKET	--RG	CKIIVGVMDIIFKG	VPQKHAEMEVLNEH	PEWRSKVVVLVQVAME	SRGDVEEYQILRSV			
91		105	106	120	121	135	136	150	151	165	166	180
1	TPS840	SESCRRINQF	GRPG	YEPVTVIDRPPVSSSE	RMAYFVSLAGCVVTA	VSDGNNLF						
2	TPS630	SLTWKRIEAF	GRPG	YEPVILIDKPKLFYE	RIAYVWECCLVTA	VSDGNNLV						
3	TPS825	XXXXKXINCKY	GRPG	YEPVIVGICNGPVSTQD	KIABMAVXECVVNA	VRDGNH						
4	yeastTPS1	NETLVGRINGQF	SEVFE	YFVLIHPNFKSIPFEE	LISLHNVSDVCLVSS	TROGNNLV						

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Alignment tobacco TPP genes with yeast TPS2

Fig. 5



1 15 16 30 31 45 46 60 61 75 76 90
1 bipsunfl1 --- --METDALPAAVEV FYVGNLADVG--PTE 27
2 yeastPS2 HTTAAQDNSEKKQR INCVQLPKIQLG ESNDWKISATWNS ALYSSLEYLQFDSPE YECHEVGTWGEITRT ERNLFTREAKRPD 90
91 105 106 120 121 135 136 150 151 165 166 180
1 bipsunfl1 QDR --- --VAVAFVETS--- --KMDQYHCF CRQYLWTFHVKVPA SDVKSVPNSRDSWNA 88
2 yeastPS2 IDDPFLYLTKEQING LTTTHQEMSKDEA KTDPTQTPTVTNNVB PVWLLRNSQRWRNY AEKVWTFHHLNLP SNECEQ--EKNWAD 178
181 195 196 210 211 225 226 240 241 255 256 270
1 bipsunfl1 VYVWKEPQVMEV VYNASNYWTHDHEI MHTGTHLRRQCR-- FNGGTHLHGFHPSSE VYKTLERNEINELKI LNDQILHFFHYDYAR 176
2 yeastPS2 VYKMEAYAKI GEV YRKG-DIITHDVAI LILLOILKMWENDES IILGHEHHRHPSMS YFCLERKKQILDLI VGNHRLFOWESFSR 267
271 285 286 300 301 315 316 330 331 345 346 360
1 bipsunfl1 EFLTCCSEAFGLDQK KKNSSDSQDQVSV MGG-DVLVDSLPIGV NTTQILKDAFTKID SKYLSISQAYQNKI IILHBLDLSVGVQ 260
2 yeastPS2 EHVSSCKRLIDATAK LKKNSSDSQDQVSV MGG-DVLVDSLPIGV NTTQILKDAFTKID SKYLSISQAYQNKI IILHBLDLSVGVQ 356
361 375 376 390 391 405 406 420 421 435 436 450
1 bipsunfl1 KVTBUEKIKSHESM QGRVWVAILNPARA R-CQVDIEINAEIRT VGERINNELGEPGYQ EFWLIDGPVSLEKA AYYALRDMATVPLR 349
2 yeastPS2 KVTBUEKIKSHESM QGRVWVAILNPARA R-CQVDIEINAEIRT VGERINNELGEPGYQ EFWLIDGPVSLEKA AYYALRDMATVPLR 446
451 465 466 480 481 495 496 510 511 525 526 540
1 bipsunfl1 DGMNLIPYEVWSRQ SVNDPENTPKKSMI VVSEHGEISLTCR INPNPDELETEREAL YDNLAPDDDEKETAB MKQYQYIISHDVANA 439
2 yeastPS2 DGMNFTALYEVVYKS HMSN---FLCYGNHL ILSEFSGSSNVLKDA INVPNDSVAVKSI NMLKLDKEEKSNI SALKWEVP--TIDDA 531
541 555 556 570 571 585 586 600 601 615 616 630
1 bipsunfl1 ARSFQDQOACIDB SRKRCNHLGGLDIR VFLPDEKFSMDIIV LENAYKQNDRAILL DYDGNWTFPSISK---SETEAVISMINKLO 525
2 yeastPS2 TNEJLSLPEKAKASD DD---VERKMTPALNRPV ILENAYKQNDRAILL DYDGNWTFPSISK---SETEAVISMINKLO 606
631 645 646 660 661 675 676 690 691 705 706 720
1 bipsunfl1 NDEKNVPIVSGSR ENLGSWFG-ACEKPA IAEHGLHFRWAGQ QMETCARENNGVME MAEFVNLVYLTIDG SMTEKREJAMVWHE 614
2 yeastPS2 ADEHQIWIHISGQD KILNMLCEKLPOLG LSAHEGCEMKDYSCQ DMVNLTEKVDMSQOV RVNVEEFPNRPFG SPTEKRVKLTWHR 696
721 735 736 750 751 765 766 780 781 795 796 810
1 bipsunfl1 DADKDLGLFCRKEIL DMLENVLANEPVAK RQYIVVEKQVBPBX LPSCYDIHBERFVES FNLNFFKFCNVRGS XGNGMAEKTFAMHE 704
2 yeastPS2 RTVPFLGCFHAKIIR ENLISFTDDFDLEVM DGRANIEVRFVFNK GEIVKRLVWBOBGP QDMKLGISCKLPKDE MPDNLCLGDDFTE 786
811 825 826 840 841 855 856 870 871 885 886 900
1 bipsunfl1 -KGOADFLVSGDD RS-FED---M FVATDGGIKI---G RHTNN---SVFTCV VGEK---PSAAEYFLD-----ETKDVIS 766
2 yeastPS2 DMFQDLNTITCWEK KYPDQKNQWNGYFY PWTGSAKKTWAKA HILDPOVILETLGLL VGDVSLFSAGTVIL DSRGHVKNSESSLES 876
901 915 916 930 931 945 946 960 961 975 976 990
1 bipsunfl1 MLEELGCLSNQ--- ---- 779
2 yeastPS2 KLASRAYVAKRSAY TGAKV 896

Fig. 6

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Alignment plant TPS genes with yeast TPS1

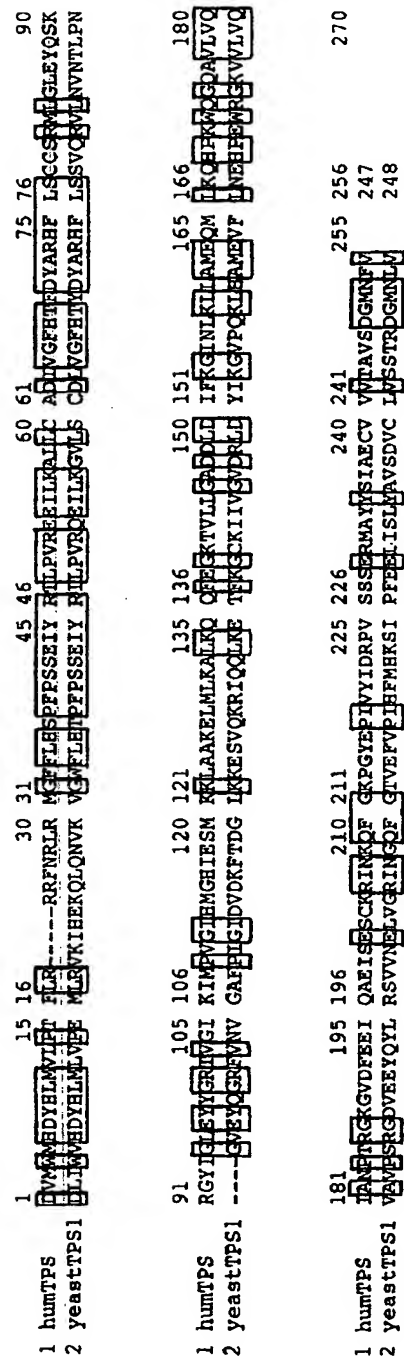
1	TPS1arab	KQEMKELKERTDRK	VNLGVDRUIMIKIP	CGLLIAPEKFF	EEENAN	RRDKVWILKIAHMR	PDVPEYQTLTSQVHE	IVGRINIRGILTAV	90
2	TPS1yeast	--RIQQLKSTKGGCK	IIVGVDRUDYIKGP	CKLEADEVFLNEHPE	ARGKRWLVQVAVESR	GDVEEYQYLRSVVNS	LVGRINIRGILTAV	IVGRINIRGILTAV	88
3	ESTrice	EWKVSSELOOQFEGKT	VLLGVDDVDFIKGLN	IAKIAFENWMTHTPK	MOGRATLVQVAVESR	GKGRDLKIAIQAEIHE	SCRRTNCEFECSGYS	IVGRINIRGILTAV	90
91	TPS1arab	PLIHHLDRSLDFEALC	ALYAVDVAQVMSLR	DGMNLY					
2	TPS1yeast	PLIEFMKRSIPYEELI	SLYAVSDVCLVSSIR	DGMNLI					
3	ESTrice	PLVVFIDRDVSSVEED	CL	-----					
					105 106	120 121	135 136	150 151	165 166
									180

Fig. 7

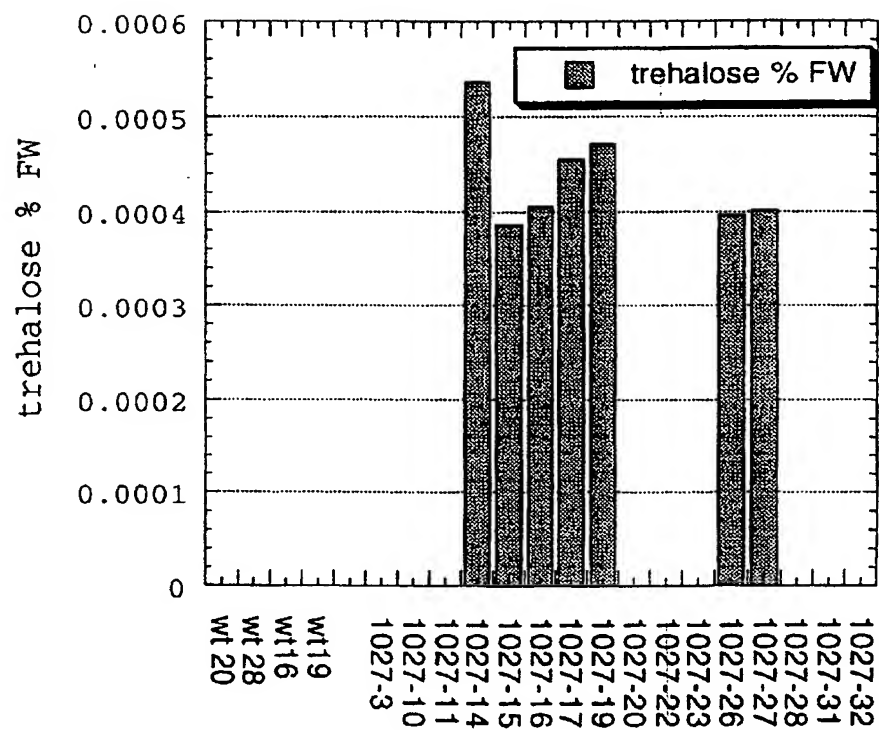
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85
90Alignment human TPS gene with yeast TPS1

Fig. 8



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S. tuberosum pMOG1027**Fig. 9**

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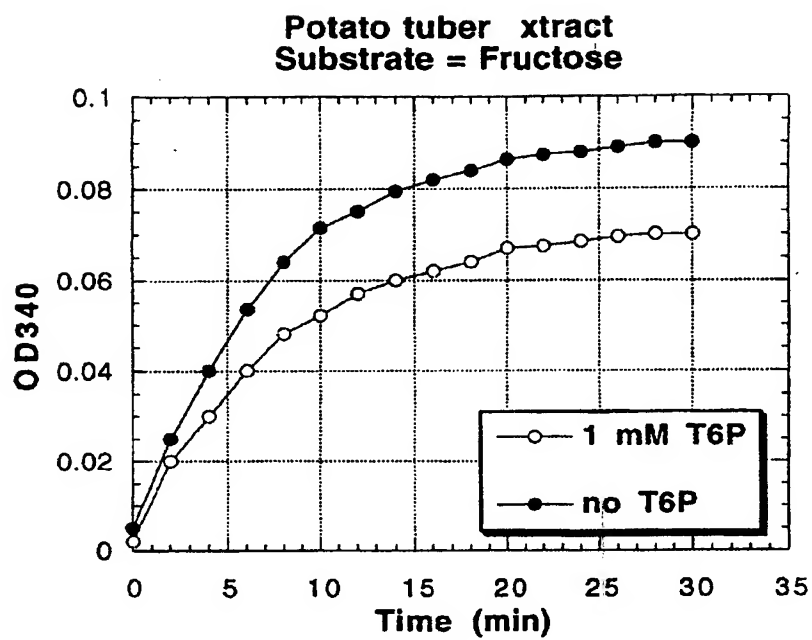
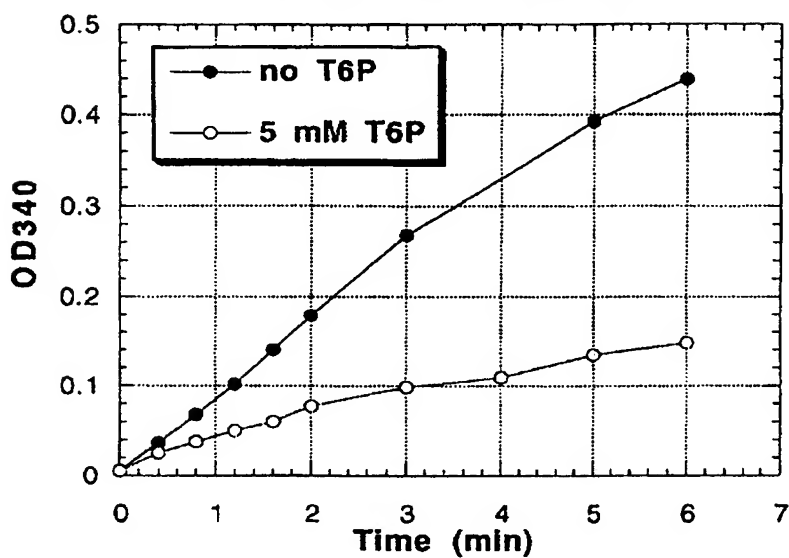


Fig. 10

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Potato tuber extract
Substrate = Fructose



Potato tuber extract
Substrate = Glucose

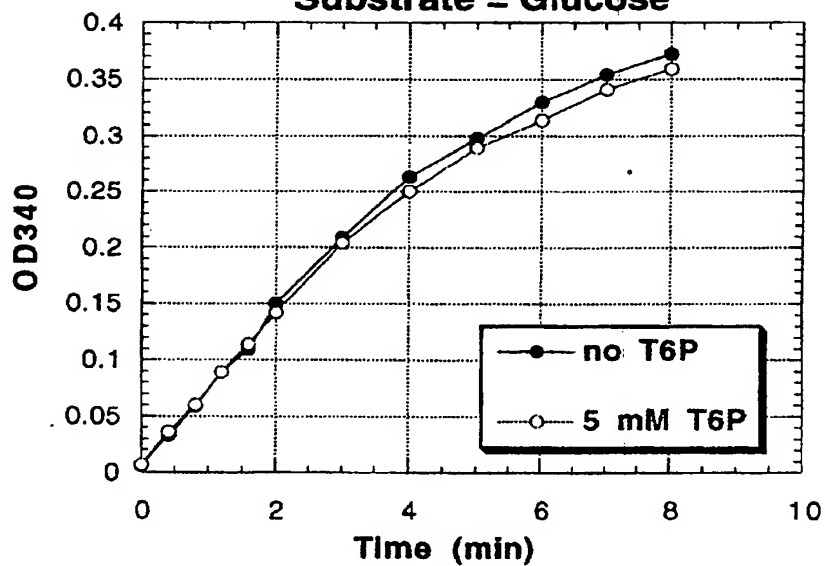


Fig. 11

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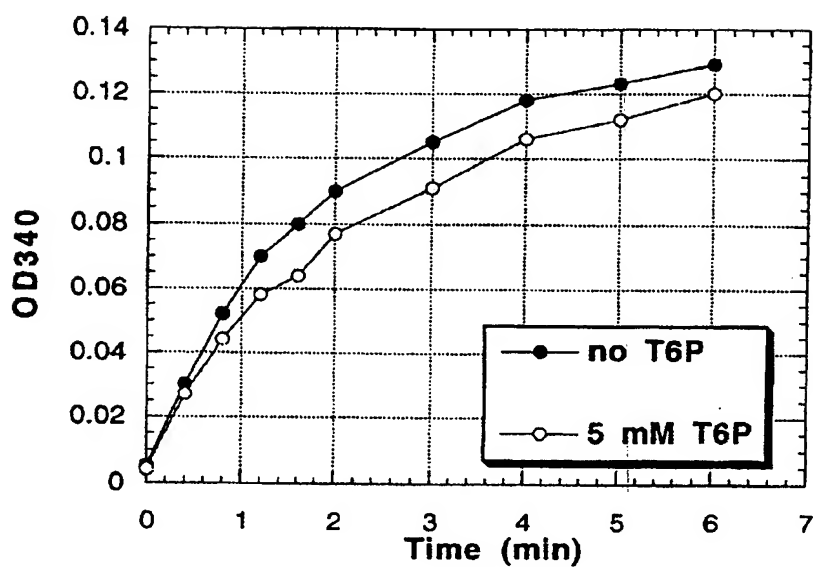
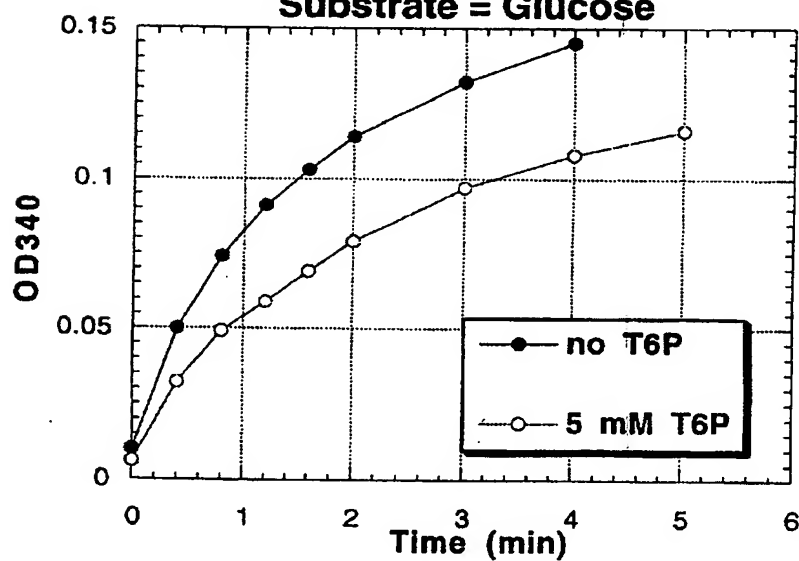
**Tobacco leaf extract
Substrate = Fructose****Tobacco leaf extract
Substrate = Glucose**

Fig. 12

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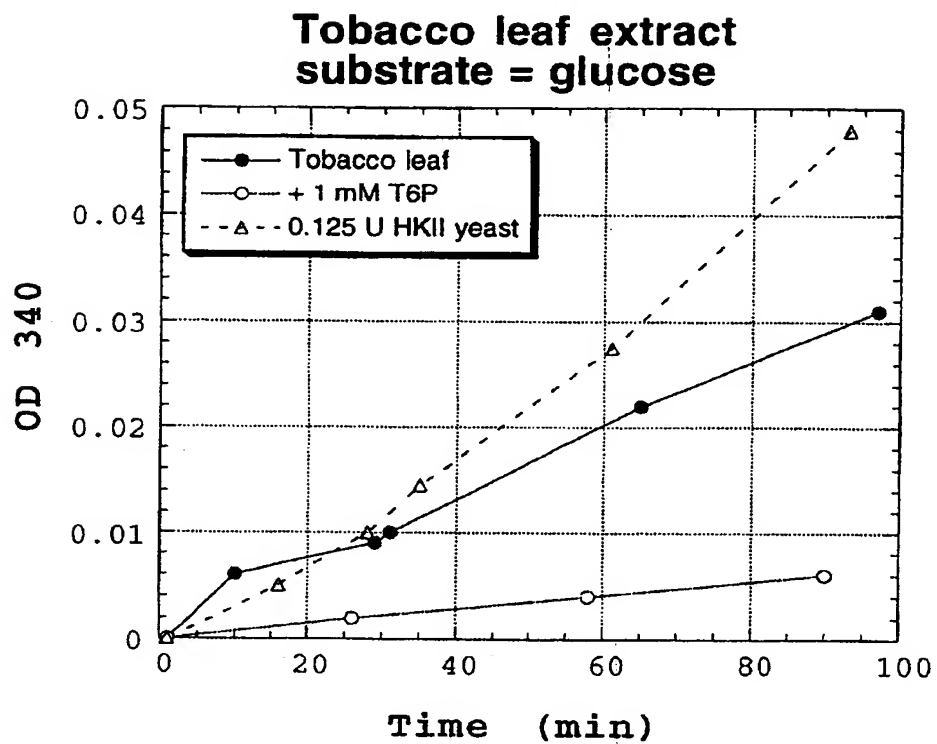
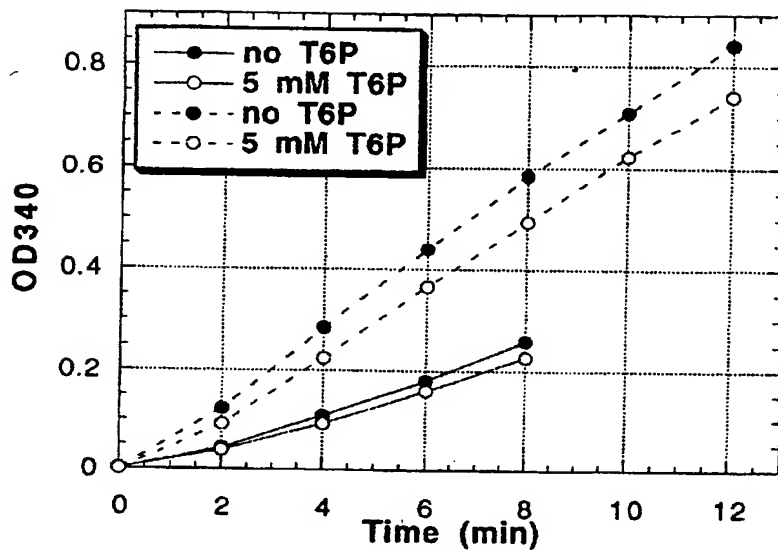


Fig. 13

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Ric leaf extract
Substrate = Fructose



Rice leaf extract
Substrate = Glucose

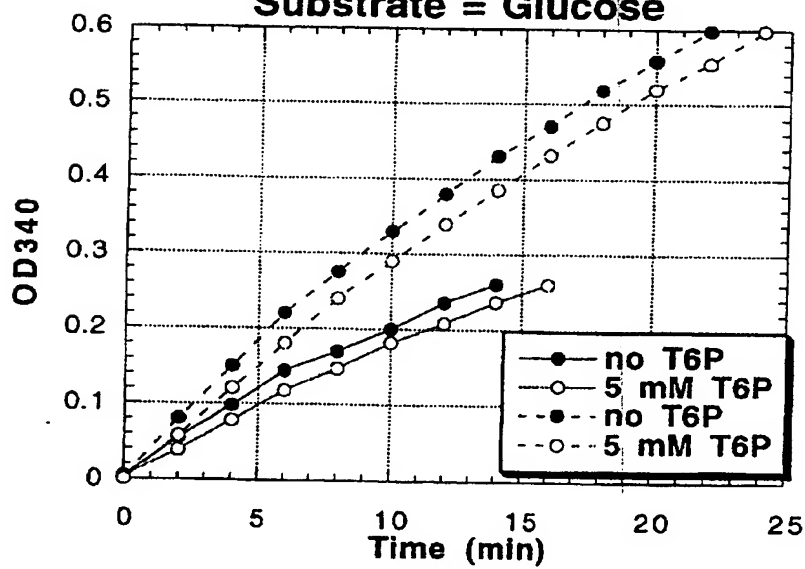
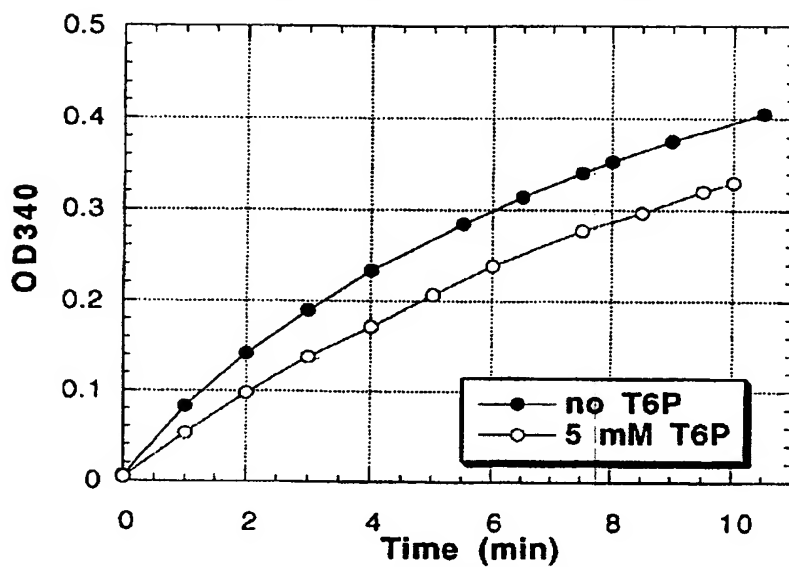


Fig. 14

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Maize leaf extract
Substrate = Fructose



Maize leaf extract
Substrate = Glucose

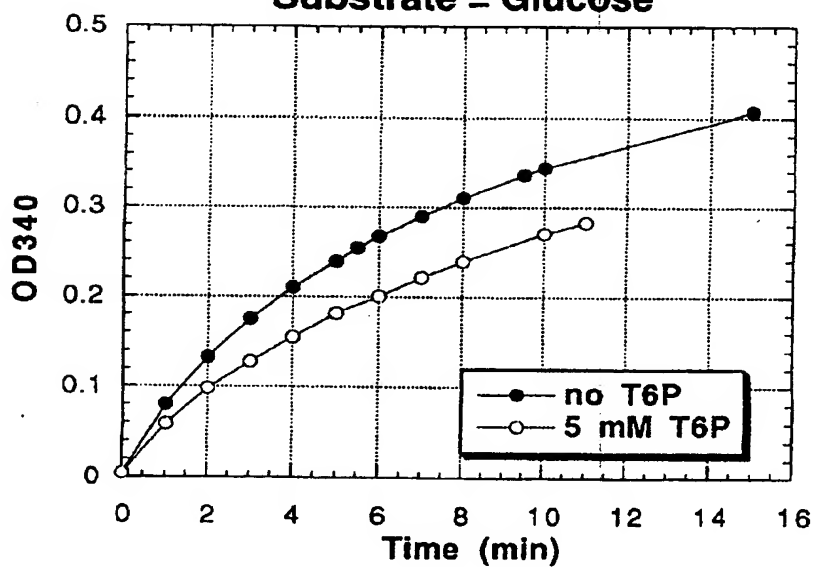


Fig. 15

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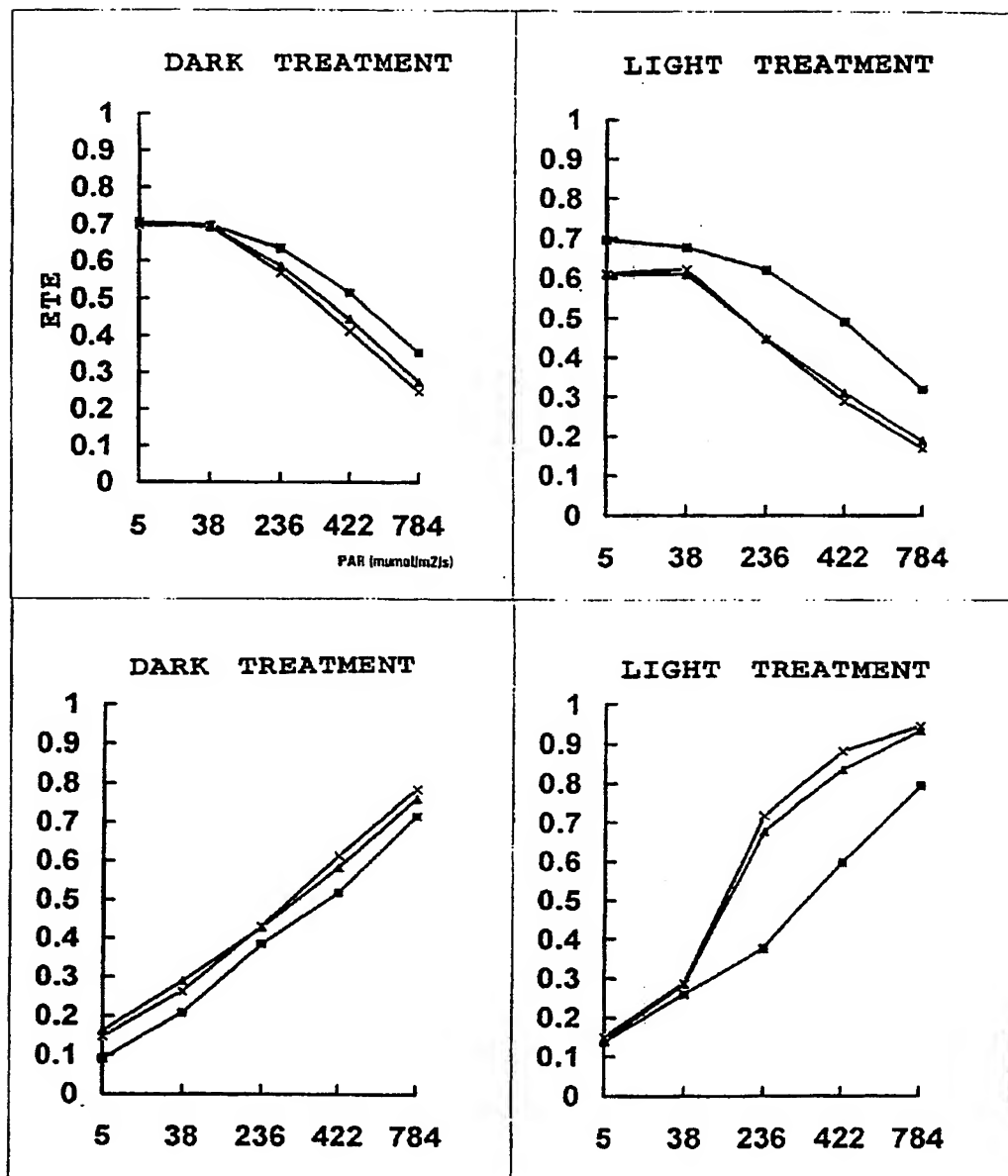


Fig. 16

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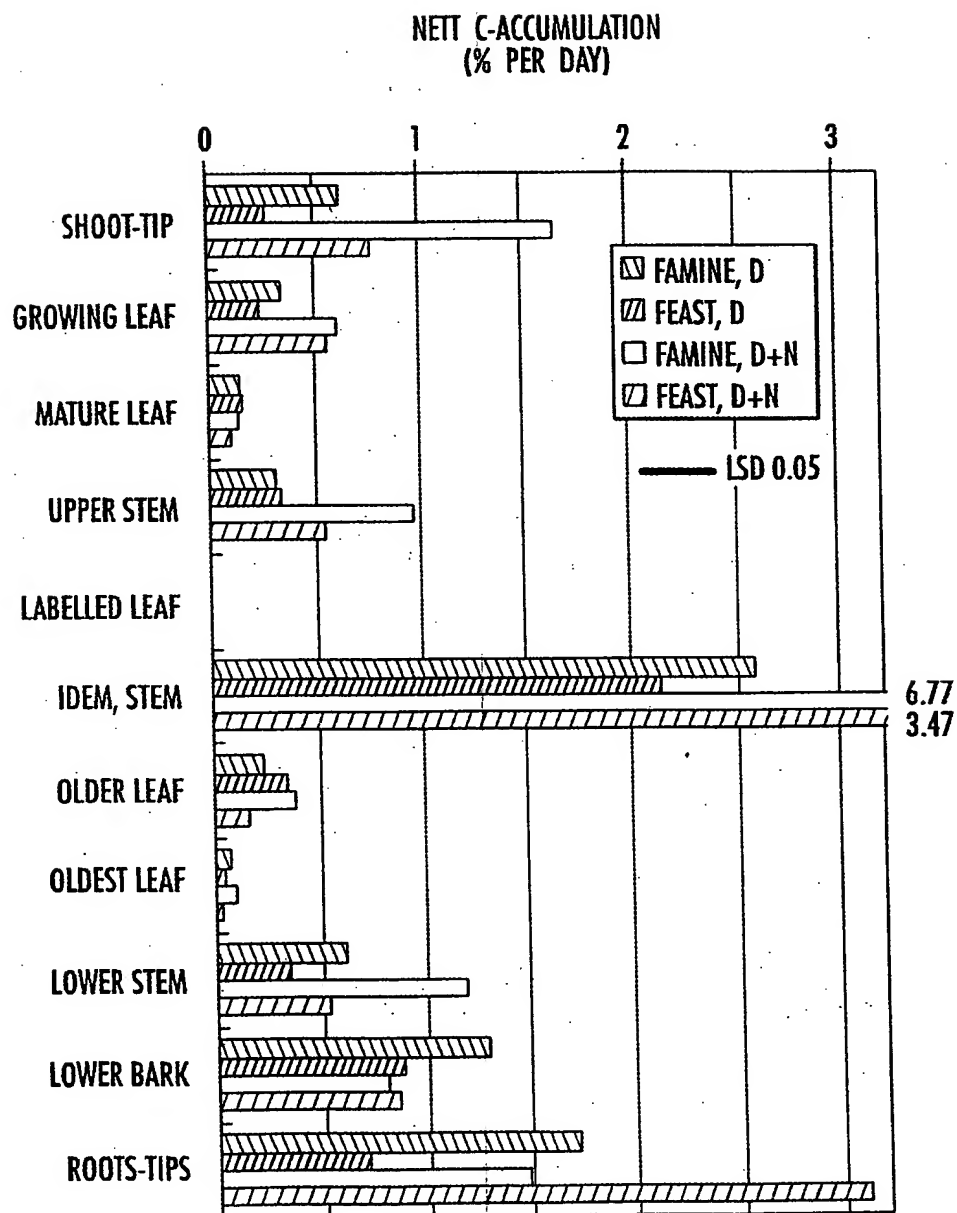


Fig. 17

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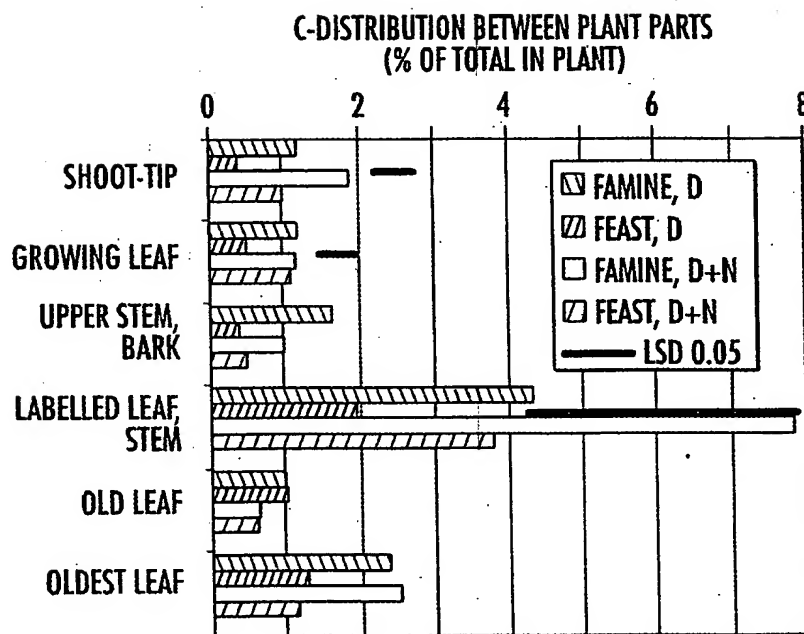
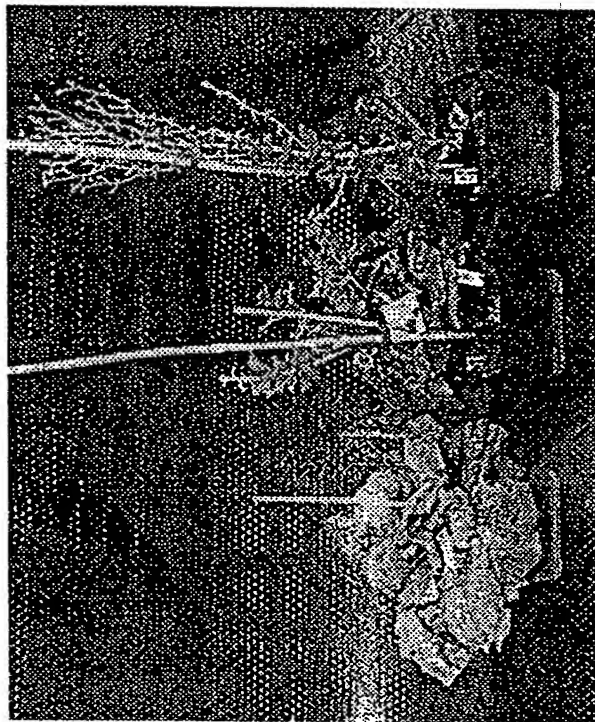


Fig. 18

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Fig. 19



TPS

CONTROL

TPP



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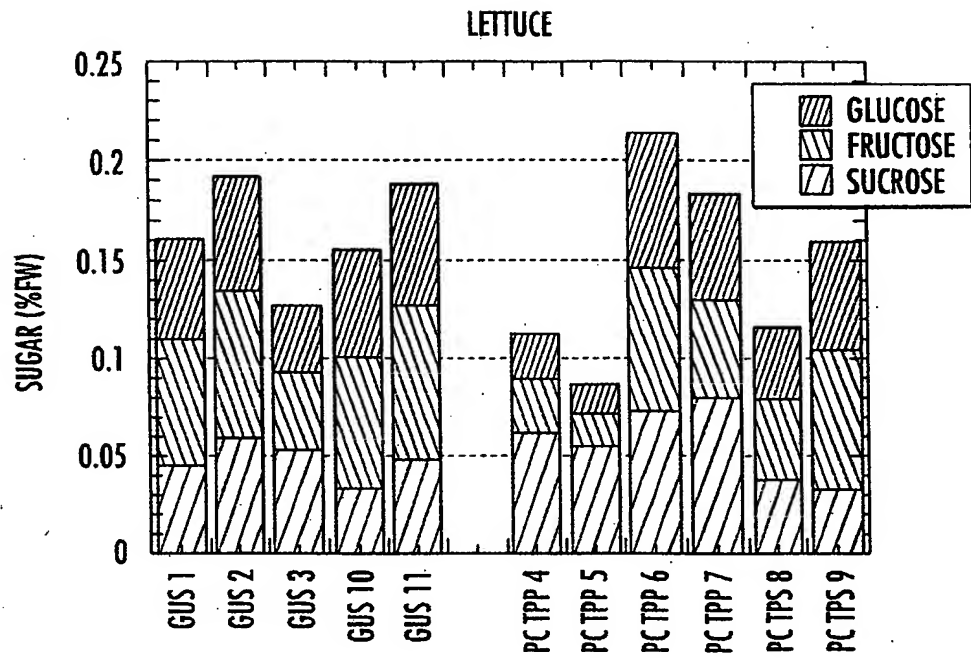


Fig. 20A

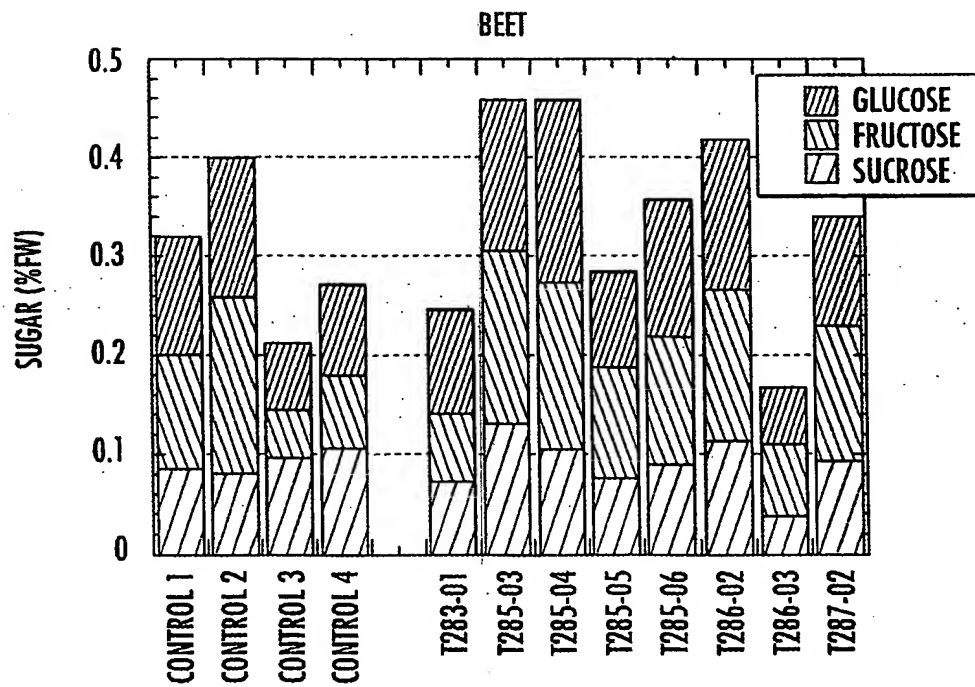


Fig. 20B

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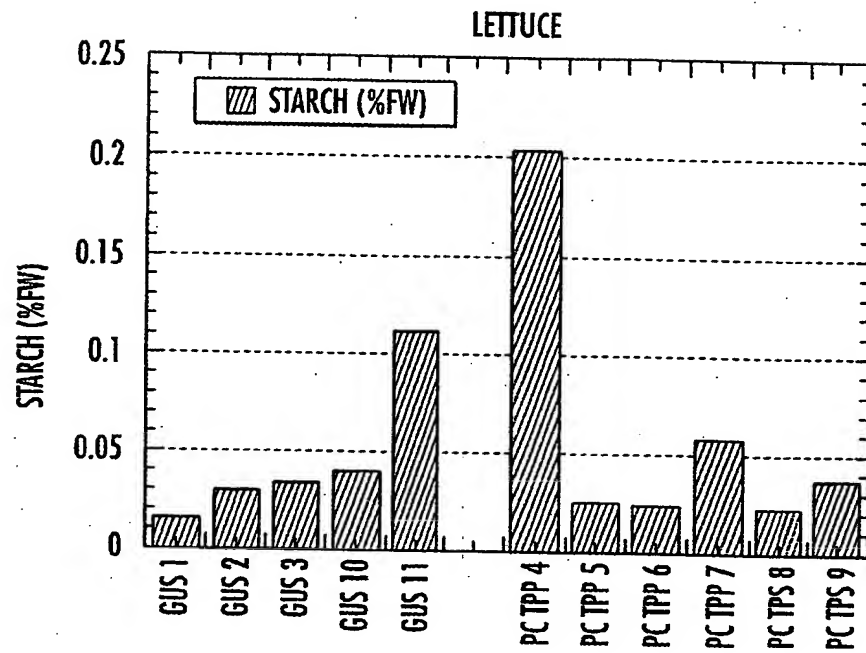


Fig. 20C

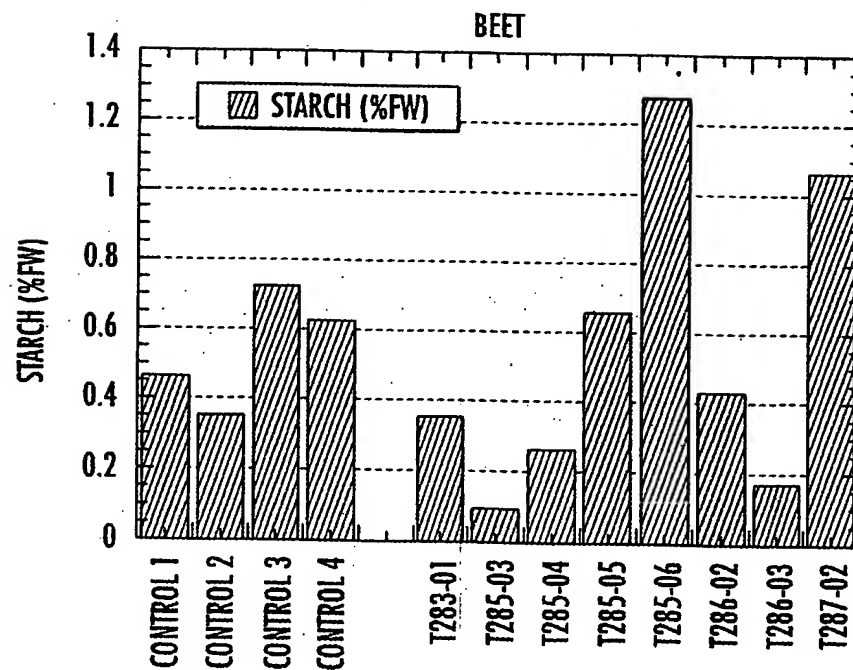


Fig. 20D

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CONTROL

TPP

TPS
(A-TYPE)

TPS
(D-TYPE)

Fig. 21

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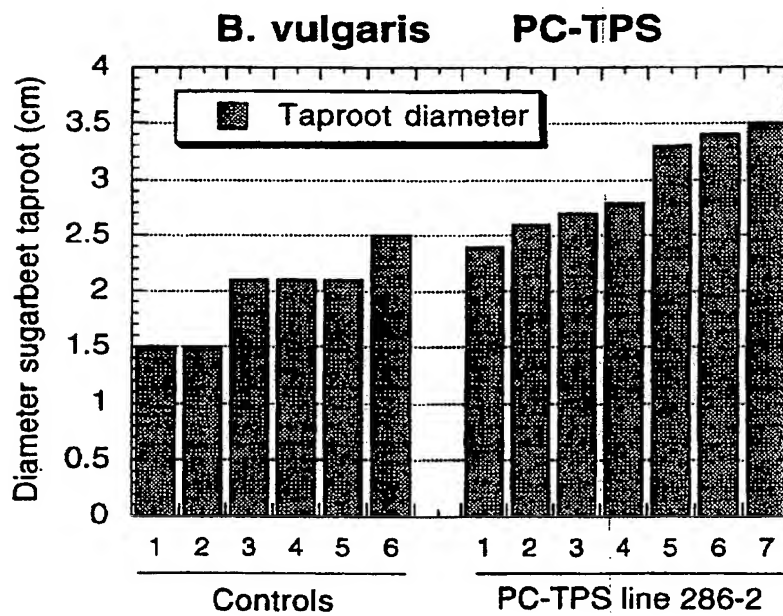
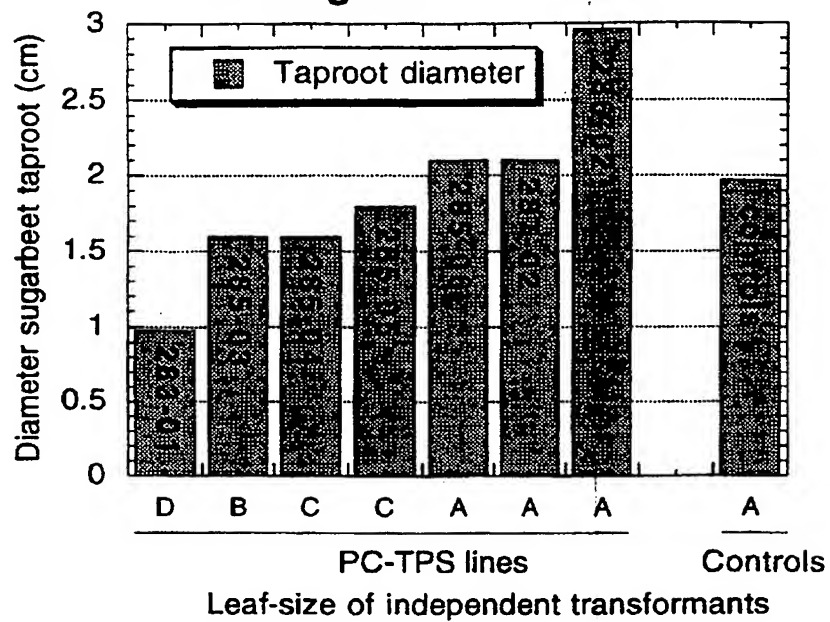
B. vulgaris PC-TPS

Fig. 22

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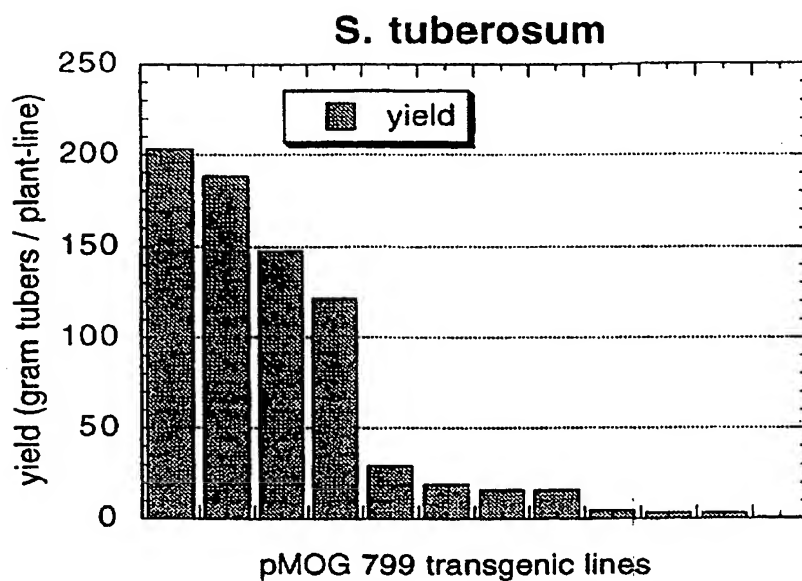


Fig. 23

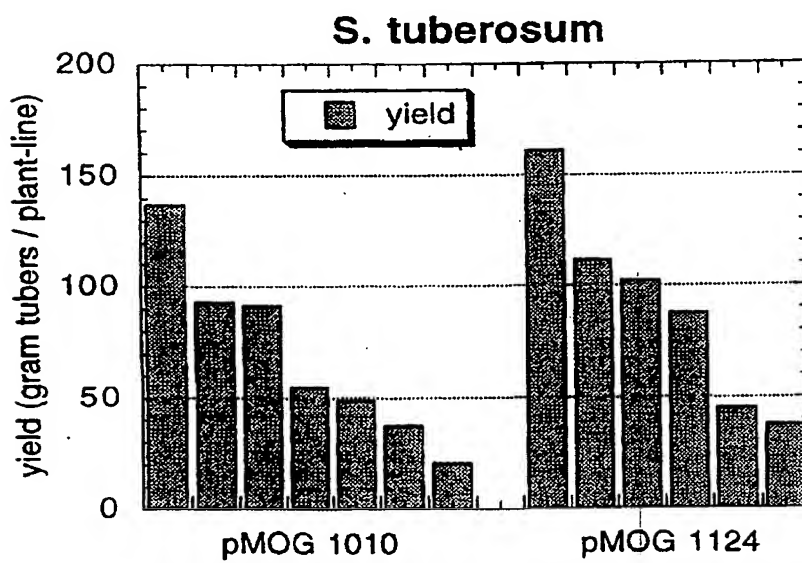


Fig. 24

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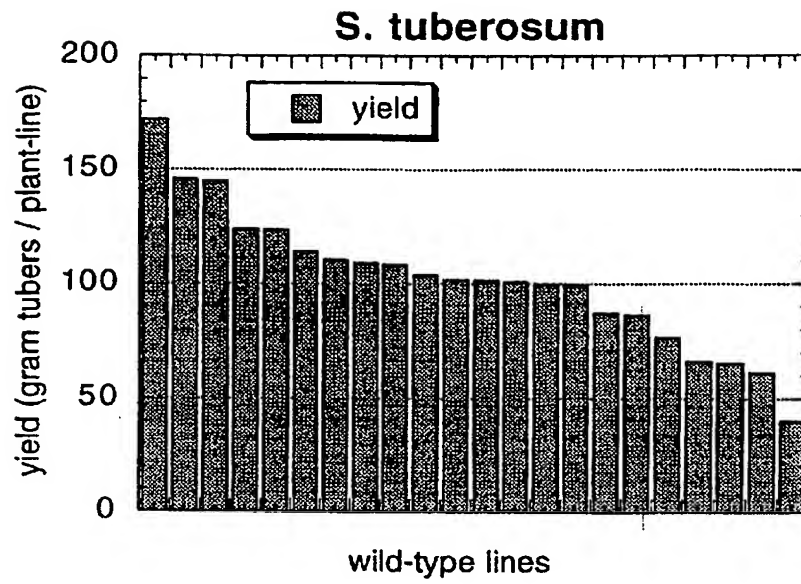


Fig. 25

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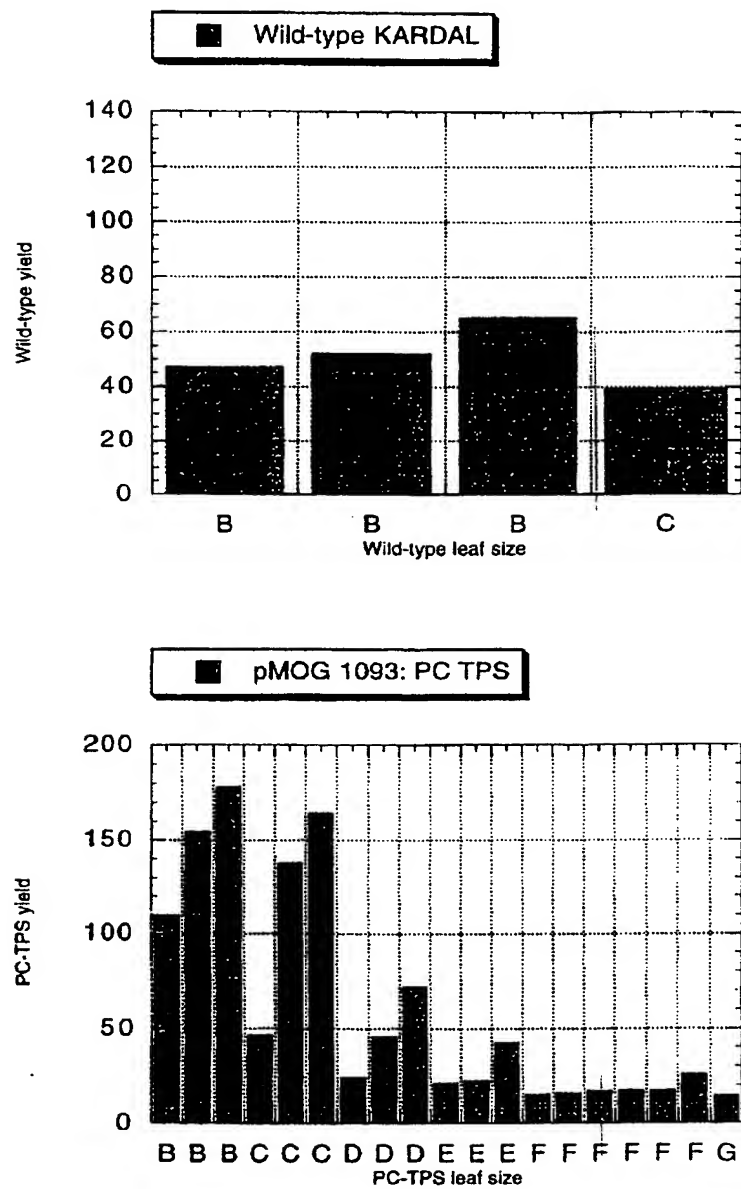
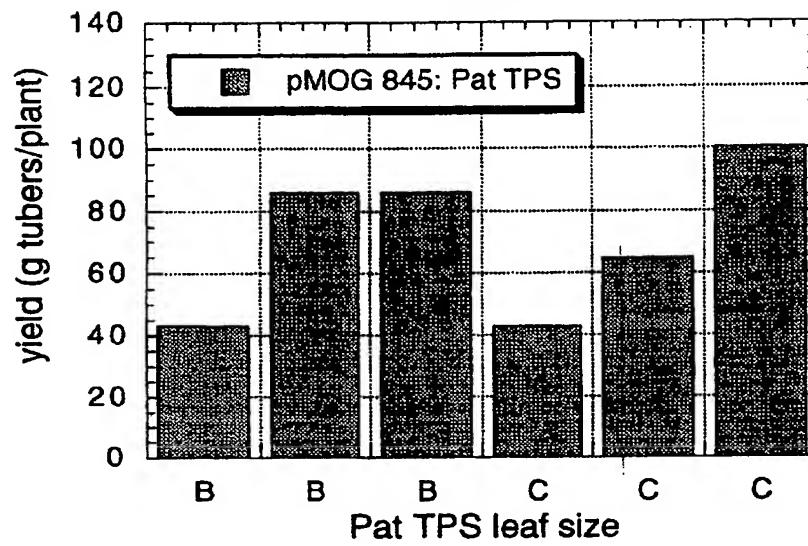
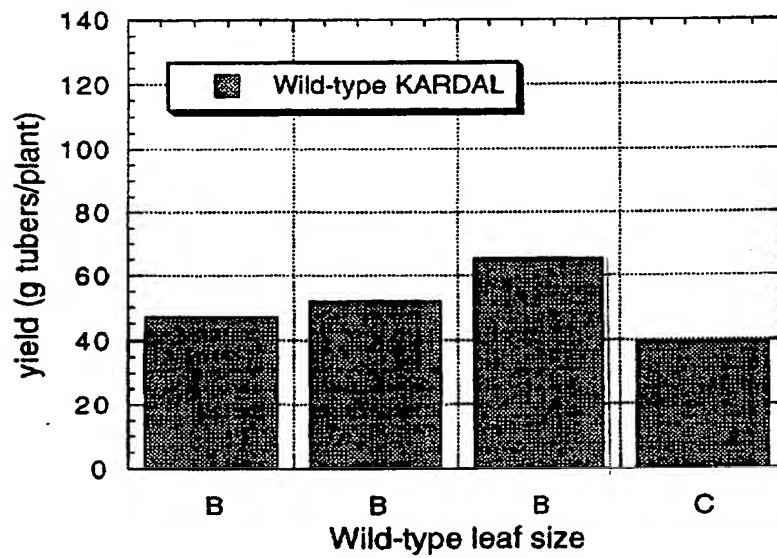


Fig. 26

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Potato**Potato****Fig. 27**

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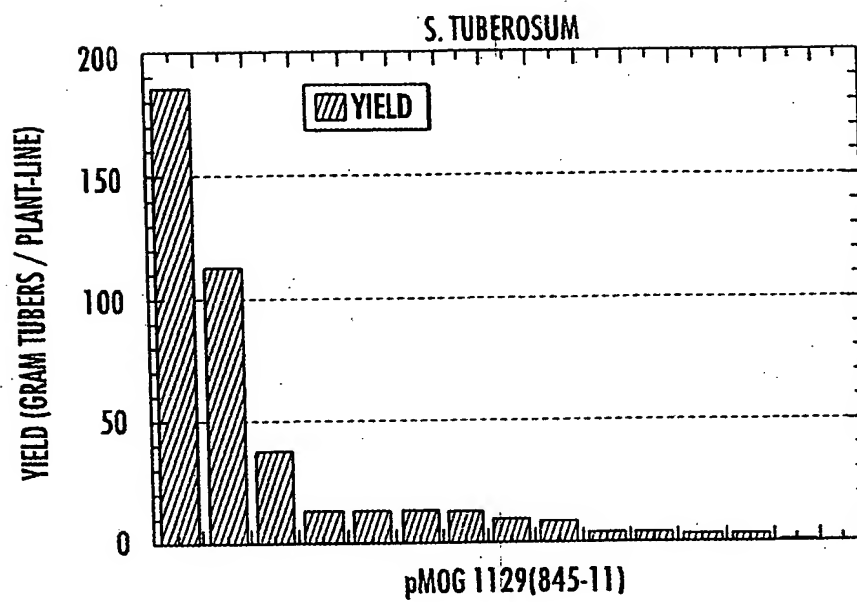


Fig. 28A

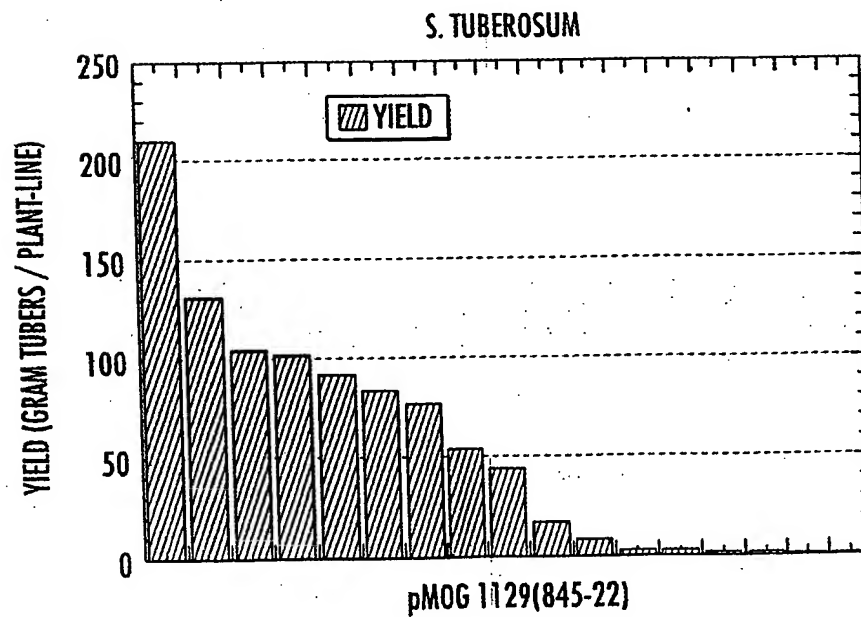


Fig. 28B

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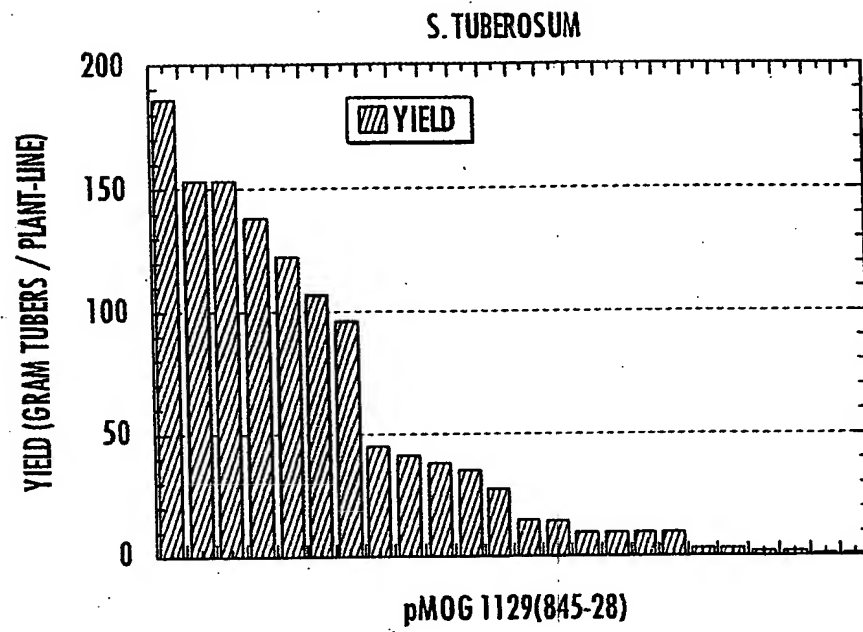
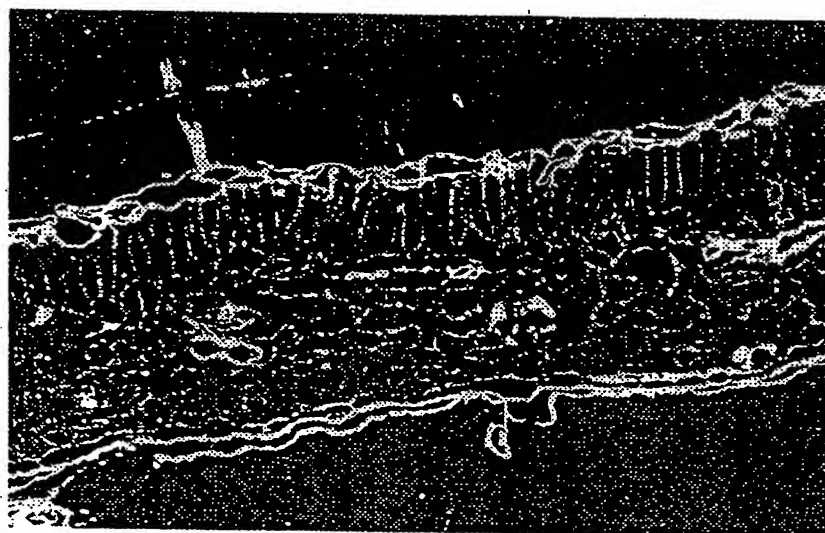


Fig. 28C

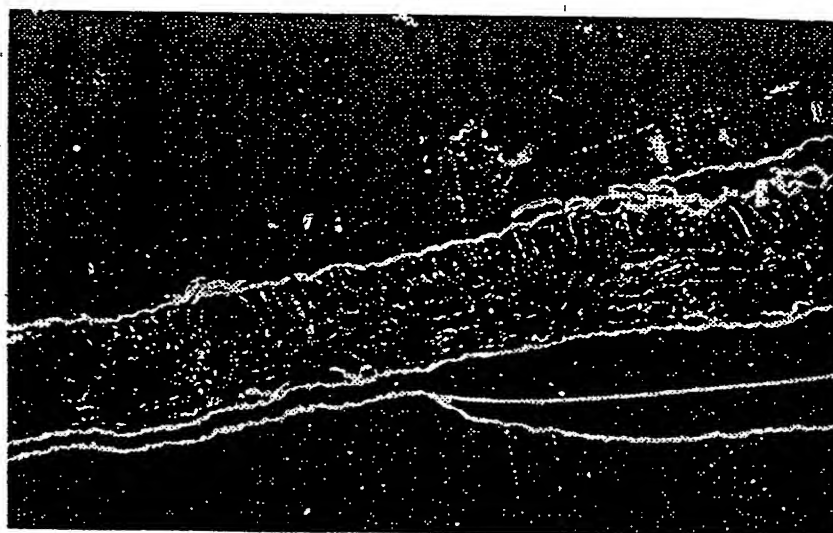
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UPPER
EPIDERMIS
←
PALISADE
MESOPHYLL
←
SPONGY
MESOPHYLL
←
LOWER
EPIDERMIS

TPS TRANSGENIC TOBACCO LEAF

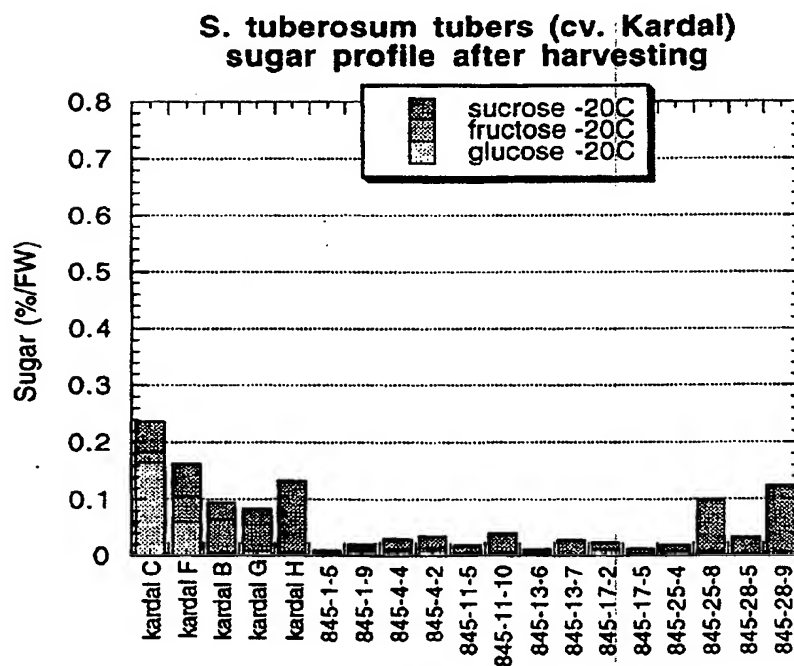
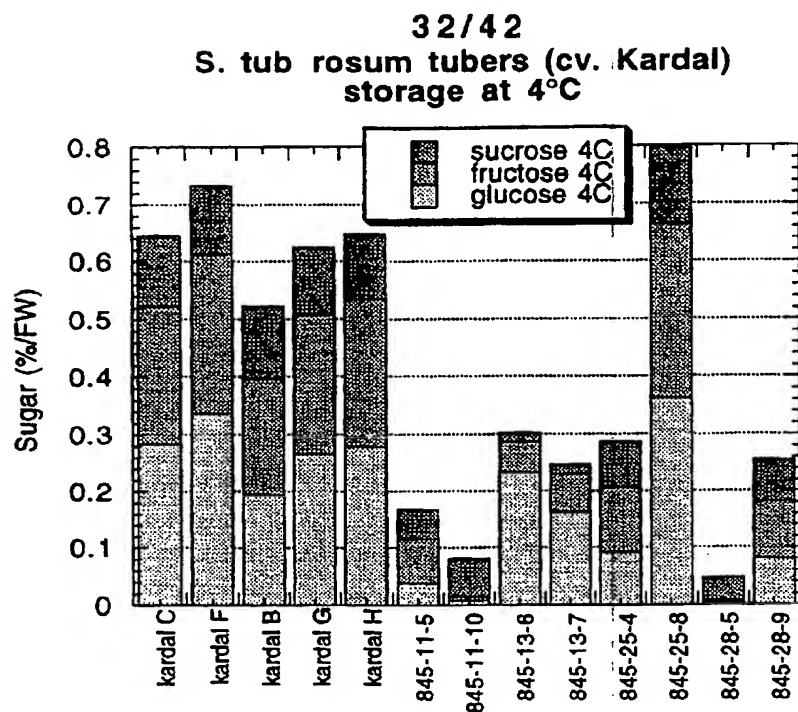
Fig. 29A



UPPER
EPIDERMIS
←
PALISADE
MESOPHYLL
←
SPONGY
MESOPHYLL
←
LOWER
EPIDERMIS

TPP TRANSGENIC TOBACCO LEAF

Fig. 29B

**Fig. 30**

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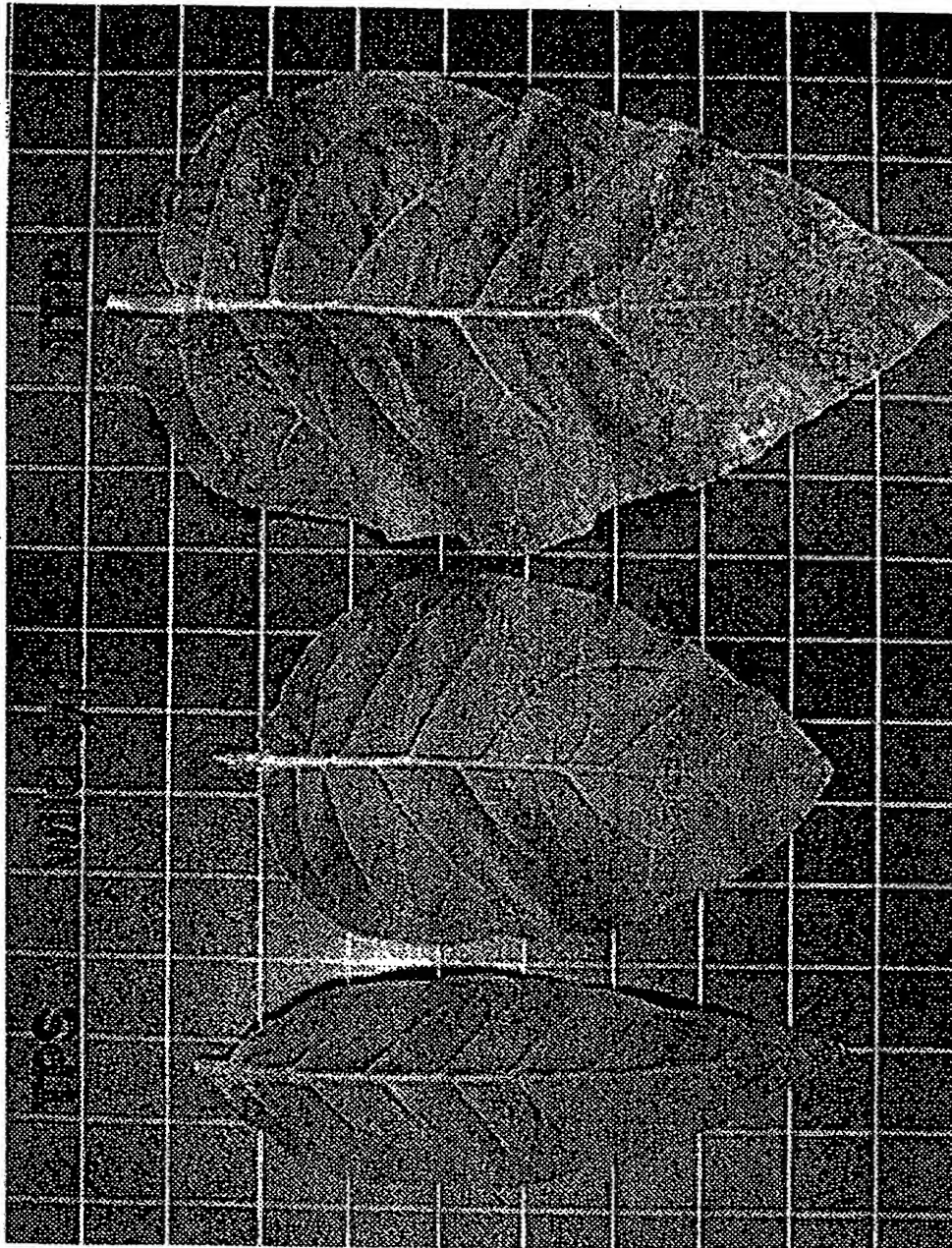


Fig. 31

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N. TABACUM

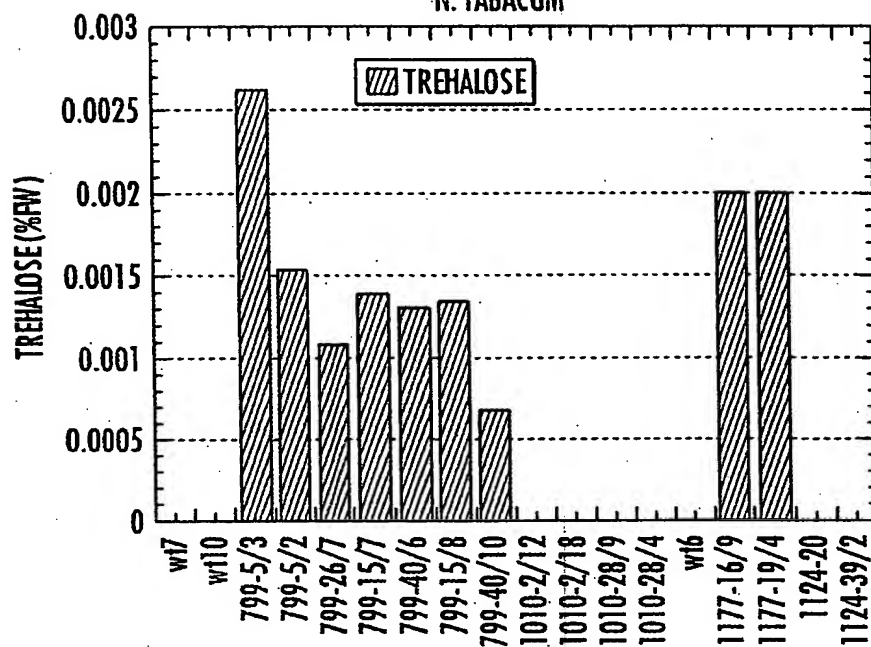


Fig. 32A

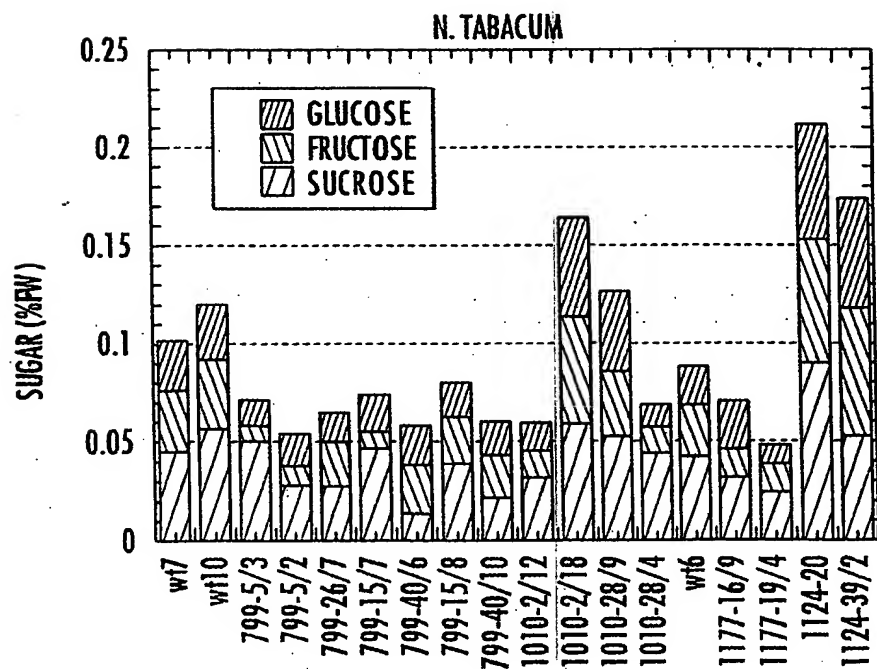


Fig. 32B

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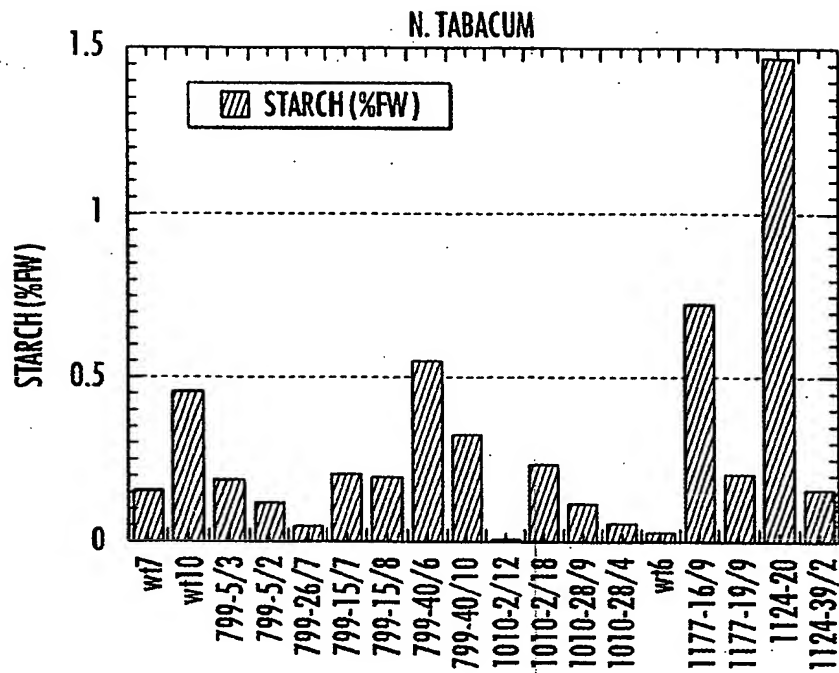


Fig. 32C

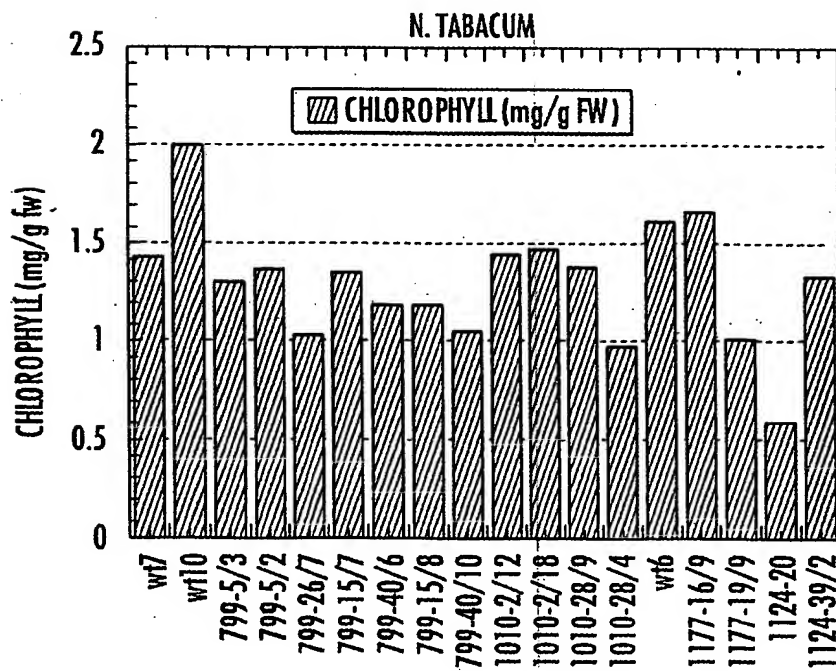


Fig. 32D

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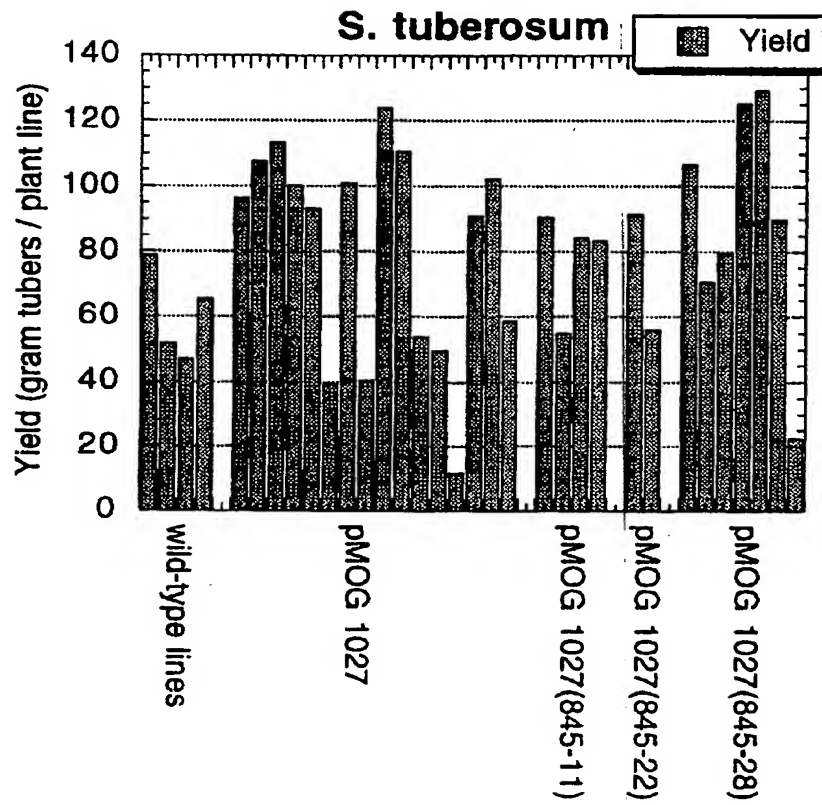


Fig. 33

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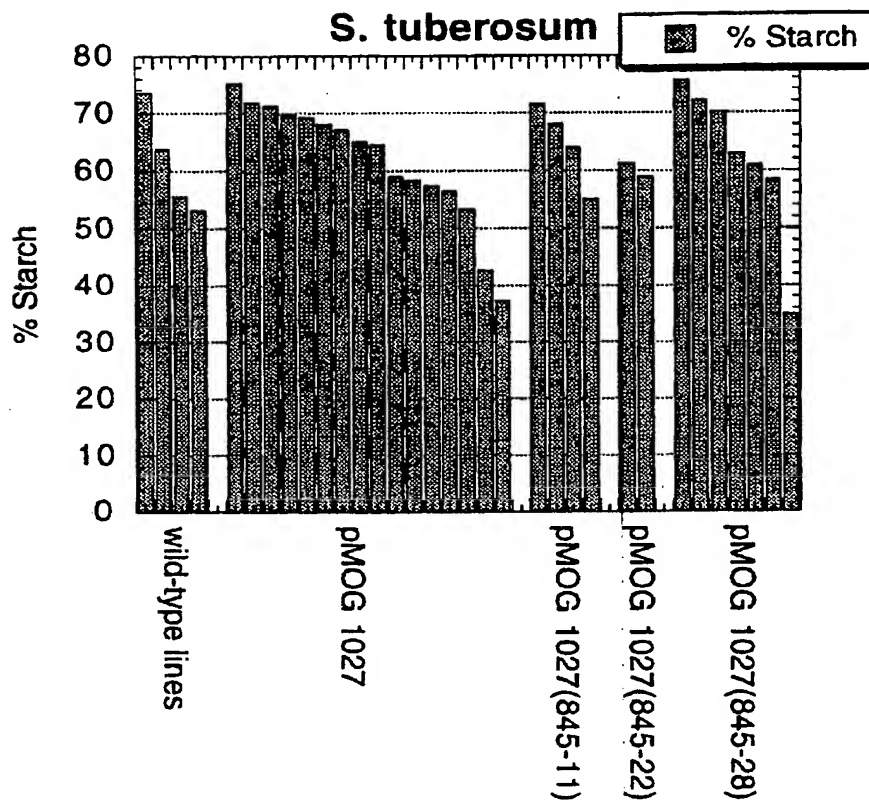


Fig. 34

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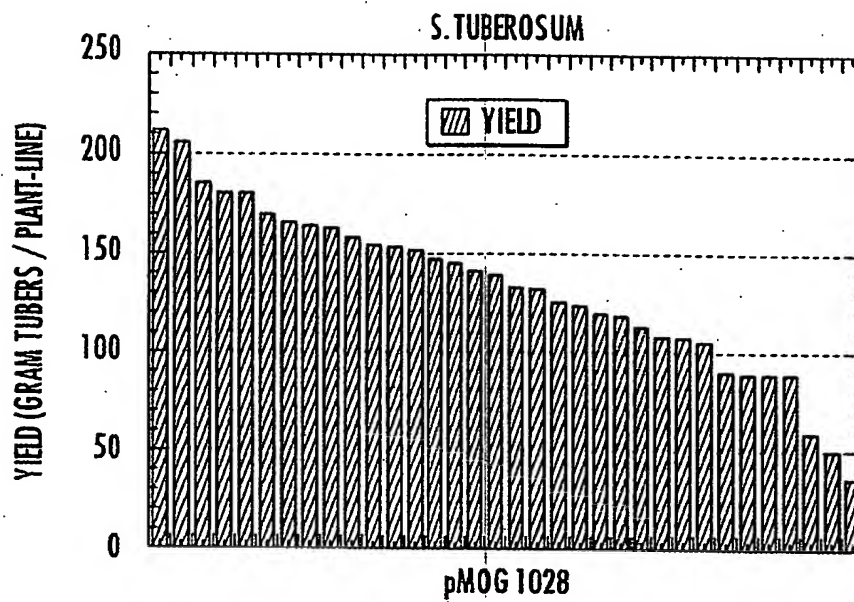


Fig. 35A

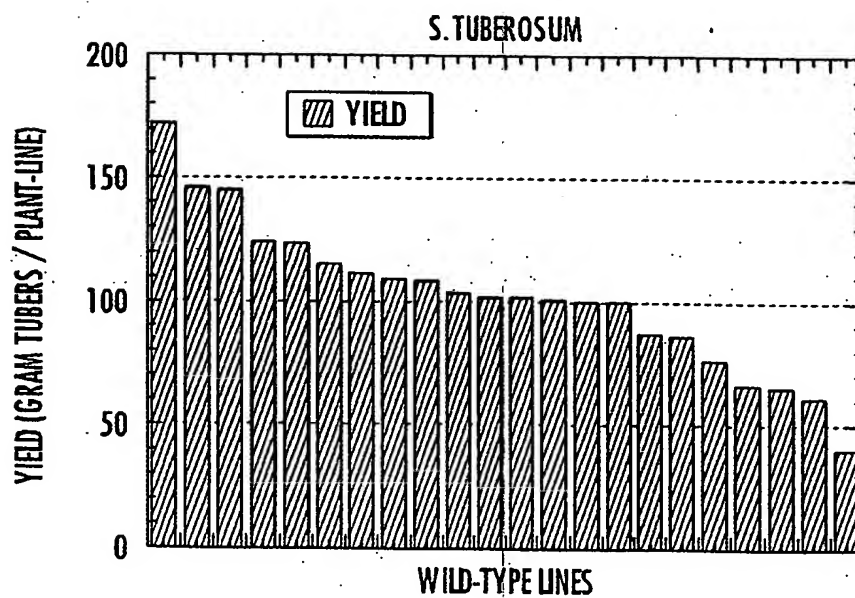


Fig. 35B

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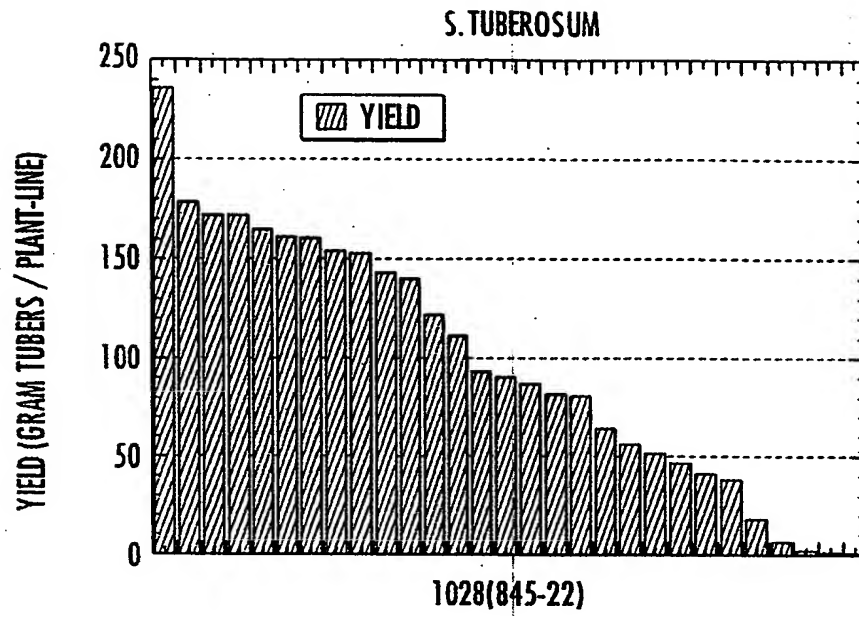


Fig. 35C

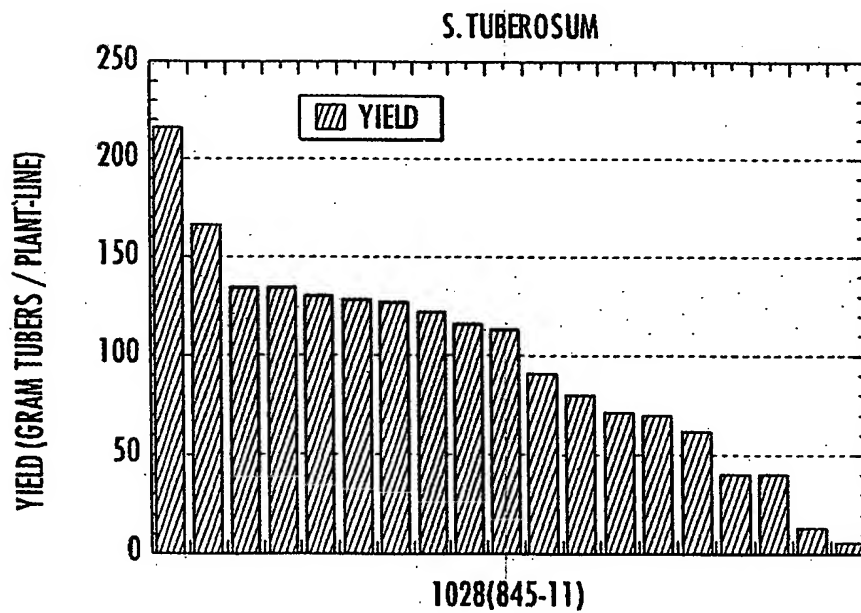


Fig. 35D

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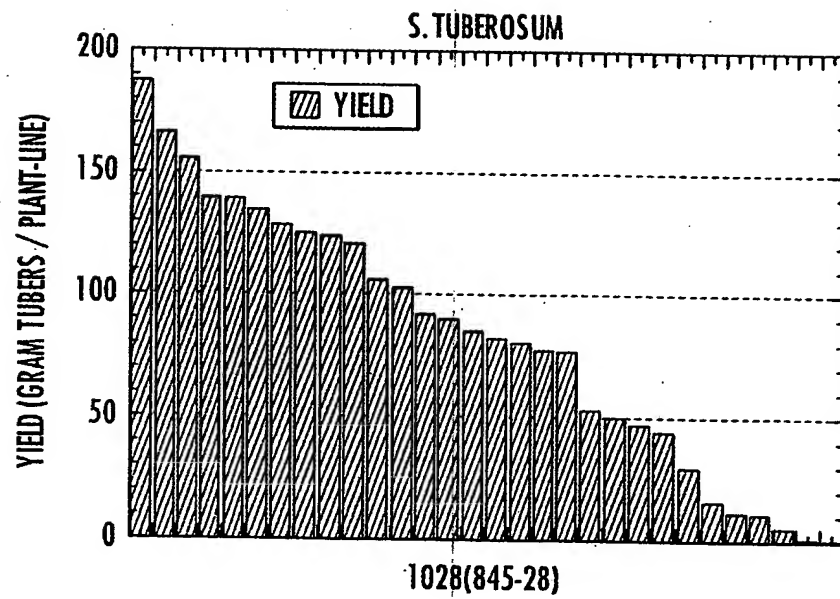


Fig. 35E

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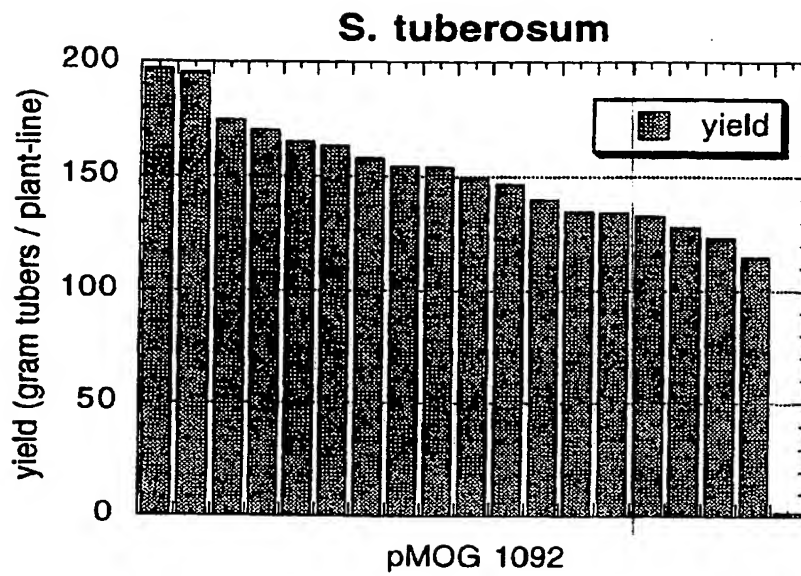


Fig. 36

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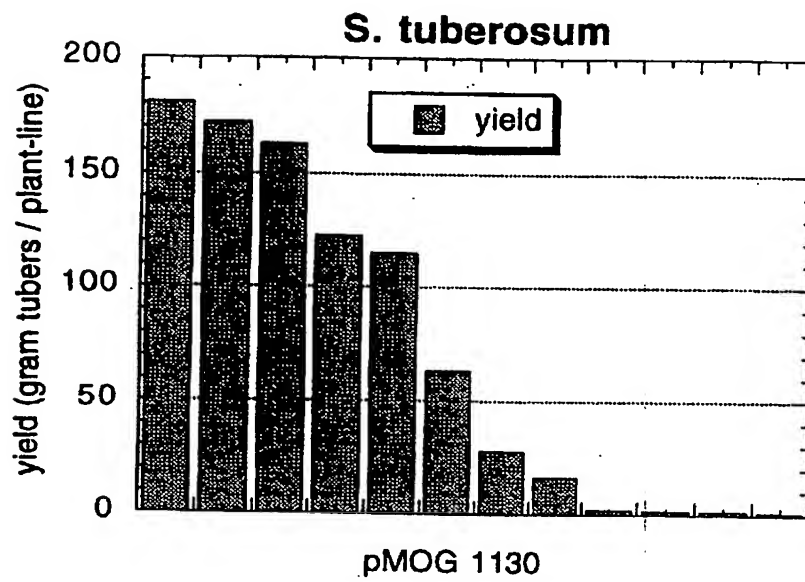


Fig. 37